

**Translation**

PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference 97 572/yf/A1	FOR FURTHER ACTION See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)	
International application No. PCT/EP2003/008580	International filing date (day/month/year) 02 August 2003 (02.08.2003)	Priority date (day/month/year) 11 December 2002 (11.12.2002)
International Patent Classification (IPC) or national classification and IPC C10B 43/08, C10K 1/06, F28G 9/00, F23J 15/06		
Applicant UHDE GMBH		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.

2. This REPORT consists of a total of 5 sheets, including this cover sheet.

☒ This report is also accompanied by ANNEXES, i.e., sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

These annexes consist of a total of 2 sheets.

3. This report contains indications relating to the following items:

- I ☒ Basis of the report
- II ☐ Priority
- III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- IV ☐ Lack of unity of invention
- V ☒ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- VI ☐ Certain documents cited
- VII ☐ Certain defects in the international application
- VIII ☐ Certain observations on the international application

Date of submission of the demand 31 March 2004 (31.03.2004)	Date of completion of this report 20 December 2004 (20.12.2004)
Name and mailing address of the IPEA/EP	Authorized officer
Facsimile No.	Telephone No.

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I. Basis of the report

1. With regard to the elements of the international application:*

☐ the international application as originally filed☒ the description:

pages 1-6, as originally filed

pages, filed with the demand

pages, filed with the letter of

☒ the claims:

pages, as originally filed

pages, as amended (together with any statement under Article 19

pages, filed with the demand

pages 1-4, filed with the letter of 22 June 2004 (22.06.2004)

☒ the drawings:

pages 1/2-2/2, as originally filed

pages, filed with the demand

pages, filed with the letter of

☐ the sequence listing part of the description:

pages, as originally filed

pages, filed with the demand

pages, filed with the letter of

2. With regard to the language, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language which is:

☐ the language of a translation furnished for the purposes of international search (under Rule 23.1(b)).☐ the language of publication of the international application (under Rule 48.3(b)).☐ the language of the translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any nucleotide and/or amino acid sequence disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

☐ contained in the international application in written form.☐ filed together with the international application in computer readable form.☐ furnished subsequently to this Authority in written form.☐ furnished subsequently to this Authority in computer readable form.☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.4. ☐ The amendments have resulted in the cancellation of:☐ the description, pages☐ the claims, Nos.☐ the drawings, sheets/fig5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).**

* Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rule 70.16 and 70.17).

** Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.

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V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Claims	1-4	YES
	Claims		NO
Inventive step (IS)	Claims	1-4	YES
	Claims		NO
Industrial applicability (IA)	Claims	1-4	YES
	Claims		NO

2. Citations and explanations

1. PCT Article 33(1)

The application meets the requirements of PCT Article 33(1) because the subject matter of claims 1 to 4 is novel and involves an inventive step (PCT Article 33(3)) in relation to the documents cited in the International Search Report.

2. PCT Article 33(2)

A gas cooler for coke furnace gas having all the technical features specified in claim 1 is not known from any of the documents cited in the International Search Report. The subject matter of claim 1 is therefore novel (PCT Article 33(2)).

3. PCT Article 33(3)

Document D1, which is considered to be the prior art closest to the subject matter of claim 1, discloses the following (see page 6, line 4 to page 7, line 18, and the drawings; the references in parentheses are to D1):

Gas cooler for coke furnace gas, with a gas flow channel carrying coke furnace gas and cooling plates (14) carrying a cooling medium, grouped together

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with channel-forming spacers (16) to form at least one heat exchanger unit; wherein the heat exchanger unit is mounted in the gas flow channel with the cooling plates (14) oriented vertically, and a spraying device (23) is provided above the heat exchanger unit; and wherein the gas flow channels (15) formed by the spacers (16) carry the coke furnace gas and are sprayed by the liquid issuing from the spraying device (23).

The subject matter of claim 1 differs from the known gas cooler in that:

- (a) the gas-facing heat exchanger surface of the cooling plates is wetted with liquid, forming a liquid film on the heat exchange surface, which film carries away the components condensed from the coke furnace gas; and
- (b) the heat exchanger unit can be inserted into the gas flow channel from the side as a replacement unit.

The problem addressed by feature (a) can be seen as that of ensuring that the gas cooling process does not have to be interrupted for the purpose of cleaning.

In the prior art the gas-facing heat exchanger surfaces of the cooling plates are cleaned intermittently, and the deposits on the heat exchanger surfaces formed by condensation of the gas components are rinsed away at regular intervals by periodic spraying. These cleaning operations require temporary diversion of the gas which is to be cooled.

In contrast, the device according to the present invention allows the gas cooler to operate without interruption, since the permanent presence of a liquid

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film on the heat exchanger surfaces prevents any formation of deposits on the cooling plates. Hence there is no need for downtime periods to allow cleaning of the heat exchanger surfaces.

Such a solution is neither known from nor suggested by the prior art. The subject matter of claim 1 therefore involves an inventive step (PCT Article 33(3)).

4. Claims 3 and 4 are dependent on claim 1 and therefore also meet the PCT requirements in respect of novelty and inventive step.
5. The subject matter of claims 1 to 4 is industrially applicable (PCT Article 33(4)).
6. Contrary to the requirements of PCT Rule 5.1(a)(ii), the description does not cite document D1 or give an account of the relevant prior art disclosed therein.